SECTION 3.2 AIR
(WAC 463-42-312)

3.2.1 AIR QUALITY

The Energy Facility Site Evaluation Council (EFSEC) is the lead state agency responsible for environmental permitting of this project. EFSEC may delegate to the Department of Ecology (Ecology) responsibility for administration of the Notice of Construction and Application for Approval (NOC) program. Ecology also has jurisdiction over air quality issues in Kittitas, Grant, Adams, and Franklin Counties, as these counties do not have a regional air quality authority.

In air quality analyses, it is important to distinguish between pollutant emissions and pollutant concentrations. Emission regulations limit the amount of a particular air pollutant per unit of time that can be emitted from a stack or facility (e.g., 10 pounds per hour of particulate matter). Ambient air quality standards limit concentrations (mass per unit of volume) of certain air pollutants in the outdoor air (in parts per million [ppm] or millionths of a gram per cubic meter of air [$\mu g/m^3$]). In Washington, Ecology limits facility emissions and controls ambient concentrations of air pollutants through the PSD and NOC permit programs. Relevant regulations governing emissions and concentrations of air pollutants through the NOC permit process are discussed below.

The focus of the ambient air quality analysis for this project is on emissions from the Kittitas Terminal, the pump stations located in Thrasher, North Bend, Stampede, Beverly-Burke, Othello, and the delivery facility located in Pasco. The Kittitas Terminal is expected to be the only source of emissions associated with this project subject to air operating permit requirements. Due to the insignificant emissions of volatile organic compounds (VOCs) and toxic pollutants, the pump stations are not subject to registration requirements to the local corresponding air quality authority.

Analysis of the proposed emissions from the proposed Kittitas Terminal determined that emissions would not exceed thresholds required for federal PSD and Title V permit requirements. Toxic air pollutant emissions also meet state Acceptable Source Impact Levels (ASILs). This section presents the methodologies and conclusions which are the basis of the NOC application. Please refer to the NOC in Section 6.1 Air Quality Permit Requirements for additional information on the assessment methodology, emissions calculations and compliance demonstration to state and federal regulations.

3.2.1.1 Regulatory Review

Ambient Air Quality Standards

In accordance with the Clean Air Act and its amendments, national ambient air quality standards (NAAQS) have been established by the Environmental Protection Agency (EPA) for several criteria pollutants: lead (Pb), ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), total suspended particulates (TSP), and particulates with aerodynamic diameters of less than 10 microns (PM_{10}). Ambient air quality standards have also been established for the State of Washington (WAAQS) by Ecology. The state has retained an ambient air quality standard for total suspended particulates which has been rescinded at the federal level. These pollutants and air quality standards are presented in Table 3.2-1. Some of these pollutants are subject to both "primary" and "secondary" standards. Primary standards are designed to protect human health with a margin of safety. Secondary standards are established to protect the public welfare from any known or anticipated adverse effects associated with these pollutants, such as soiling, corrosion, or damage to vegetation.

Prevention of Significant Deterioration

Prevention of Significant Deterioration (PSD) regulations were established by the EPA to ensure that new or expanded sources of air pollution do not cause a significant deterioration in air quality in areas which currently meet ambient standards. EPA has created a list of 28 major source categories by which types of facilities are classified for PSD regulations. The threshold for determining whether a facility is a major source, and therefore subject to PSD regulations, is whether a facility which falls within one of the 28 listed categories emits greater than 100 tons per year of any criteria pollutant; or whether a facility not listed emits greater than 250 tons per year of a criteria pollutant. If a source triggers PSD requirements for one pollutant category, other pollutants emitted in significant amounts may also be subject to PSD, even if they are emitted in quantities below PSD trigger levels. These significant volumes are presented in Table 3.2-1. The PSD regulations also set ambient impact "increments" that limit the allowable increase of ambient concentrations of criteria pollutants over a determined baseline concentration.

TABLE 3.2-1
AMBIENT AIR QUALITY STANDARDS AND PSD SIGNIFICANT EMISSION RATES

Pollutant	NAAQS Primary	NAAQS Secondary	WAAQS	PSD Significant Emission Rates (tons/year)	PSD Class I Increments (ug/m3)	PSD Class II Increments (g/m3)
Total Suspended Particulate Matter (TSP)						
Annual Geometric Mean (μg/m)^3	NA	NA	60	25	NA	NA
24-hour Average (μg/m^3)			150	NA		
Inhalable Particulate Matter (PM10)						
Annual Arithmetic Mean (μg/m^3)	50	50	50	15	5	19
24-hour Average (μg/m^3)	150	150	150	NA	10	37
Sulfur Dioxide (SO_2)						
Annual Average (ppm)	0.03		0.02	40	2	20
24-hour Average (ppm)	0.14		0.10	NA	5	91
3-hour Average (ppm)		0.50		NA	25	512
1-hour Average (ppm)			0.40[a]	NA	NA	NA
Carbon Monoxide (CO)						
8-hour Average (ppm)	9		9	100	NA	NA
1-hour Average (ppm)	35		35	NA	NA	NA
Ozone (O_3)						
1-hour Average (ppm)[b]	0.12	0.12	0.12	40	NA	NA
Nitrogen Dioxide (NO_2)						
Annual Average (ppm)	0.05	0.05	0.05	40	NA	NA

Note: Annual standards never to be exceeded; short term standards not to be exceeded more than once per year unless otherwise noted.

μg/m^3 = micrograms per cubic meter; ppm = parts per million

(a) Also, 0.25 not to be exceeded more than twice in seven days
(b) Not to be exceeded on more than 1.0 days per calendar year as determined under the conditions of Chapter 173-475 WAC

The most stringent increments apply to "Class I" PSD areas, which include wilderness areas and national parks. The remaining areas in Washington state are designated as Class II areas. PSD regulations required those facilities which trigger PSD review to provide a detailed analysis of source emissions impacts on Class I areas. The intent of the PSD increments is to prevent air quality areas with concentrations below the ambient air quality standards from reaching the standards, i.e., keep pristine and clean areas clean. The Class I areas nearest to Kittitas are the Alpine Lakes Wilderness (approximately 35 miles northwest) and Mt. Rainier National Park (approximately 45 miles southwest). The general vicinity of the Kittitas site is designated "Class II," where less stringent PSD increments apply.

PSD will not be applicable to this proposal for the following reason: potential emissions at the Kittitas Terminal are limited to emission rates below the trigger threshold of 100 tons per year. PSD applicability is determined for each pollutant-emitting facility. According to 40 CFR 52.21 a facility is defined as a source which is within the same industrial grouping (SIC code), is located on one or more contiguous or adjacent properties, and is under common control.

For this proposal, the breakout facility of the pipeline (the Kittitas Terminal) is determined to be one separate facility from the pipeline and pump stations. The pump stations are classified as Pipelines/Refined Petroleum Pipelines, with an SIC code of 4613. The terminal is classified as Gas Services/Gas Production and/or Distribution with an SIC code of 5171. For this reason, the Kittitas Terminal in conjunction with the pipeline and pump stations do not meet the criteria for one facility. Additionally, the Pasco facility is not under the same control as the pipeline or the Kittitas Terminal. Consequently, the pipeline is considered one facility, the Kittitas Terminal considered a second facility, and the Pasco facility is excluded from the two previous facilities. In addition, predicted potential emissions described in this section are less than the threshold which triggers PSD for either of the facilities. Therefore, PSD does not apply.

Notice of Construction and Application for Approval

The Energy Facility Site Evaluation Council (EFSEC) is the lead state agency responsible for environmental permitting of this project. EFSEC has adopted most air quality regulations promulgated by Ecology and may authorize operating permit conditions but must direct information to Ecology's permit register (WAC 463-39-100). WAC 173-400-091 states an authority with jurisdiction over a source, such as EFSEC, can issue a regulatory order that limits the source's potential to emit any air contaminant to a level agreed to by the owner and Ecology, and that this order shall be federally enforceable upon approval into the state implementation plan. EFSEC also may delegate to Ecology responsibility for administration of the NOC program. Also, sources under EFSEC jurisdiction must submit permit applications using standards forms developed by Ecology which must contain information pursuant to Ecology's Operating permit regulations. Ecology has jurisdiction over air quality issues in Kittitas, Grant, Franklin, and Adams Counties, as those counties do not have a regional air quality authority. For these reasons, this section is written in accordance in conjunction with Ecology's permitting requirements.

State law requires new air contaminant sources in Washington to file an NOC and undergo new source review (WAC 173-400-110). The Notice of Construction application provides a description of the facility and an inventory of pollutant emissions and controls. Requirements for new sources in unclassified areas, such as for the Kittitas Terminal, are provided in WAC 173-400-113 as follows:

- The source must demonstrate compliance with New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAPs), and applicable source or emission standards.
- The facility must employ Best Achievable Control Technology (BACT).
- Allowable emissions must not cause or contribute to a violation of the ambient air quality standards.
- If applicable, the source must meet PSD requirements.
- The source must comply with toxic requirements.
- If applicable, the source must comply with visibility protection review requirements.

Before an NOC is deemed complete and approved, the reviewing agency considers whether BACT has been employed and evaluates ambient concentrations resulting from these emissions to ensure compliance with ambient air quality standards. After the facility is constructed, it is inspected to ensure its compliance with the plans and specifications submitted with the NOC. This may include tests to determine the actual emissions from the facility.

OPL has determined that potential emission considering maximum operational and design capacities must be limited in order to demonstrate compliance with the benzene ASIL. The voluntary limitations for which OPL seeks, and are the basis for this analysis, are as follows:

- Storage tank fuel throughput- 36,639,000 barrels per year;
- Loading rack daily maximum throughput - 1,020,000 gallons per day; and
- Vapor recovery system with 99.9% removal efficiency.

With these limitations in place, the Kittitas Terminal will not emit greater than 17 tons per year of VOCs, and less than 10 tons per year of any one hazardous air pollutant (HAPs) or 25 tons combined HAPs. For this reason the Kittitas facility should be considered a synthetic minor source.

Monitoring and recordkeeping requirements for this facility will be utilized to demonstrate compliance with a minor source permit. The following methods will be used for compliance demonstration:

(1) Metering devices at the pipeline will be used to record fuel volume throughput in to the storage terminal. The maximum fuel volumes within any consecutive 12 month period will be limited to 36,639,000 barrels per year. Each fuel type (gasoline, diesel, jet turbine fuel) will be recorded and quantities used to calculate VOC emissions.

(2) VOC and benzene emissions will be calculated monthly and recorded from storage tank losses and losses due to fugitive emissions (equipment leaks).

(3) Loading rack VOC and benzene emissions will be controlled by limiting annual throughput of fuel dispensed to 1,020,000 gallons per day. On a daily basis, fuel type and quantities loaded will be recorded.

(4) Emissions from the loading rack equipment will be calculated, including emissions from the VRS and fugitive emissions from the associated loading rack equipment, and recorded monthly.

The methods presented throughout this application will be used to calculate monthly emissions from the corresponding equipment at the terminal. A 12-month running total will be recorded and monitored to ensure that the permit limits will not be exceeded: VOC emissions 17 tpy, benzene emissions 390 pounds per year. The Kittitas Terminal NOC is included in Appendix D. Pump stations will not require an NOC for Ecology or local air pollution authorities because emissions are insignificant and the pumps are operated electrically.

New Source Performance Standards (NSPS)

Storage Tanks

EPA regulates storage tank facilities under 40 CFR Part 60, Subpart Kb, entitled "Standards of Performance for Volatile Organic Liquid Storage Vessels Constructed After July 23, 1984". This standard has been adopted by Ecology in WAC 173-400-115. This regulation is applicable to storage tanks with capacities equal to or greater than 40 cubic meters, such as those proposed for this project. However, storage tanks with capacity greater than 151 cubic meters and liquid contents held at a maximum total vapor pressure less than 3.5 kilopascals (Kpa) are exempt from most of the requirements of this regulation. This exemption applies to the diesel and jet fuel tanks maximum true vapor pressures are <1 Kpa, to which only recordkeeping and monitoring requirements apply. The tanks to which the full regulation applies are the gasoline (43 Kpa) and ethanol (6 Kpa) tanks because the maximum true vapor pressure of the contents is greater than 3.5 Kpa. This regulation also governs the type of storage tank to be constructed (fixed roof with internal floating roof); the types of seals to be used on the floating roof (mechanical shoe seals, vapor/liquid mounted seals); and the testing, recordkeeping, and reporting requirements associated with each type of tank and seal. Testing includes visual inspections of the tank, gaskets, seals, and other components. Record keeping and monitoring requirements include dimensions of the tank, the contents, the period the liquid is stored, and the true vapor pressure of the liquid stored in the tank. The facility will comply with this regulation by installing the following design and equipment for all tanks at the facility:

- Fixed external cone roof with welded internal floating roof;
- Primary and secondary vapor-mounted rim seals;
- Adjustable legs to support the internal floating roof during maintenance and repair periods; and
- Gasketed apertures.

Recordkeeping and monitoring requirement will be conducted as specified in 40 CFR 60 Subpart Kb for each storage tank.

Loading Rack

The delivery of gasoline through loading racks to tank trucks is regulated under 40 CFR Part 60, Subpart XX). This standard is applicable to all bulk gas terminals whose daily throughput is greater than 75,700 liters (20,000 gallons) per day. Requirements under this regulation pertain to emissions of VOCs from the vapor collection system, the proper loading of fuel into vapor-tight tank trucks, inspection and leak detection, and documentation. According to this NSPS, the vapor collection system shall not allow emissions to exceed 35 milligrams per liter of gas loaded. Tank trucks must be tested and documented regarding the vapor-tightness of each tank and records must be kept on file at the bulk facility. The daily throughput at the Kittitas Terminal is estimated to be greater than 20,000 gallons per day, and therefore the facility must meet these requirements. The loading rack at the Kittitas Terminal will comply with regulation by installing the required control equipment, ensuring that all tanker trucks are tested for vapor-tightness, and requiring operational conditions and methods to minimize fuel leakage during loading. The following is a review of control methods to be used at the loading rack:

- Dispensing fuel from the storage tank into tanker trucks using bottom-loading, submerged loading with dry coupling attachments at the product-loading arms. This method is considered to be the most effective means to reduce VOC losses during loading.
- Product cannot be loaded until all safety and vapor recovery equipment are properly affixed to the truck.
- The vapor recovery system with a 99.9% removal efficiency.
- Tank trucks are to be leak-checked and verified to be vapor-tight.

Recordkeeping and monitoring requirements will be implemented as stated in the NSPS.

3.2.1.2 Emission Standards and Controls for Sources Emitting Gasoline Vapors

Ecology regulates sources which emit gasoline vapors in WAC 173-491. This regulation sets forth emission and control strategies which facilities must incorporate if they emit gasoline vapors. The control strategies which apply to the Kittitas Terminal concern the loading rack, tanker truck requirements, and the vapor recovery system. These requirements expand upon those stated in the NSPS and supersede WAC 173-490, Emission Standards and Controls for Sources Emitting VOCs.

The Kittitas Terminal, a gasoline loading facility, will comply with this regulation by meeting NSPS requirements for fixed roof tanks (WAC 173-491-040(1)), as discussed in the previous subsection. The loading rack operation and design parameters also comply with this regulation with the installation of a 99.9% VRS, and meeting gasoline transfer operations, as discussed in the previous subsection. The required monitoring and recordkeeping, as stated in 173-491-040(6)(c), will be implemented at the facility.

3.2.1.3 National Emission Standards for Hazardous Air Pollutants (NESHAPs)

NESHAPs are developed by EPA to limit and control emissions of hazardous and toxic air pollutants which are emitted by sources or source groups. Applicability of sources to NESHAPs is determined by each individual NESHAP. The NESHAPs which are applicable to the Kittitas Terminal are those regulating fugitive equipment leaks. Other NESHAPs would potentially regulate the terminal but are excluded from applicability for reasons provided.

NESHAPs Governing Equipment Leaks

NESHAPs for equipment leaks are cited in 40 CFR 63 Subpart J (benzene fugitive emissions) and Subpart V both promulgated in the early 1980's. The benzene NESHAP requires those sources in benzene service to comply with subpart J. Subpart J requires facilities to perform visual inspections monthly of pump seals. If a visual leak is observed, monitoring with instrumentation is required. If a leak (>10,000 ppm above background) is detected then repair must be initiated within 5 calendar days and completed within 15 calendar days. This is referred to as a leak detection and repair (LDAR) program. Valves must be instrument monitored monthly, and then quarterly if 2 consecutive months show no leakage. If a leak is found, then monitoring is again required monthly, and repairs must be made within 15 calendar days. At flanges and connectors, if a potential leak is found either visibly, audibly or olfactory, then instrument monitoring must confirm the presence of a leak within 5 days. A confirmed leak must be repaired within 15 calendar days. Recordkeeping and reporting are integral part of this regulation. The Kittitas Terminal has an inspection and maintenance program which meets the requirements of this regulation. Visual inspection is performed at the terminal, and instrument monitoring will be implemented if a leak is found. Valves will be monitored accordingly.

Gasoline Distribution MACT

The gasoline distribution Maximum Achievable Control Technology is a categorical source NESHAP promulgated by EPA in 1994. The gas MACT (40 CFR 63 Subpart R) applies to those facilities which are determined to be major sources emitting greater than 100 tons per year of VOCs. This determination can be made using two methods: an emission inventory can be developed demonstrating that the source does not emit VOCs greater than 100 tons per year; or by using the provided equation to determine an emission ratio. If the ratio is less than 0.5 then the gas MACT is not applicable. The source must notify EPA that emissions are less than applicable thresholds. If the ratio is greater than 0.5 but less than 1.0, then recordkeeping and reporting is required. If emissions are greater than 1.0 then the control technologies as well as recordkeeping and reporting are required. The Kittitas Terminal will not be a major source, as determined by the detailed emission inventory provided int his application, applying enforceable limitations on potential emission as requested. Because these limits are federally enforceable the Kittitas Terminal potentially emits less than 50 tons per year of VOCs. The facility will comply with the gas MACT by notifying EPA accordingly.

Toxic Air Pollutant Regulations

Ecology regulates emissions of known carcinogenic and toxic air pollutants (TAPs) from new and modified air pollution sources (WAC 173-460). This regulation establishes acceptable outdoor exposure levels (called Acceptable Source Impact Levels, or ASILs) for more than 500 substances. The ASILs were set conservatively to protect human health. For each "known, probable and potential" human carcinogenic pollutant (the Class A toxic air pollutants), the ASIL limits the risk of an additional cancer case to one in a million. For others (Class B toxic air pollutants), the ASIL was set by dividing those Class B toxics which have an inhalation reference factor by 300; this is intended to protect public health in communities with multiple sources of toxic air pollutants. Most of the Class A toxic air pollutant ASILs are based on an annual average concentration. A few of the Class A pollutants and all of the Class B pollutants are based on a 24-hour average concentrations. Additionally, all new sources of toxic emissions must apply T-BACT.

A facility can demonstrate compliance with WAC 173-460 by meeting established Small Quantity Emission Rates (SQER's) or by dispersion modeling. If a source which emits toxic air pollutants does not meet designated SQERs, a dispersion analysis should be performed, comparing modeled ambient concentrations and the ASILs. If modeled concentrations are less than the ASILs, a permit can be granted. If not, the applicant must revise the project or submit a health risk assessment demonstrating that toxic emissions from the source are sufficiently low to protect human health. For carcinogenic pollutants, the risk of an additional cancer case cannot exceed one in 100,000. The Kittitas Terminal will comply with WAC 173-460 using dispersion modeling to demonstrate that ASILs have been met. A discussion of BACT is also provided.

Existing Ambient Air Quality Conditions

For this application, the sources expected to create emissions of air pollutants are the Kittitas Terminal and, to a lesser extent, the pump stations proposed along the pipeline. The Kittitas Terminal is located in unclassified areas for all established criteria pollutants. Portions of the pipeline lie within King and Snohomish counties with recently reclassified attainment areas for ozone, carbon monoxide and PM10. Thrasher, North Bend Pump and Stampede Stations are located within this area under the jurisdiction of PSAPCA. All other areas of the pipeline, and the Kittitas Terminal are within Ecology's jurisdiction.

Ecology maintains a network of state and local ambient air monitoring stations throughout the state of Washington. These stations are located mainly in urban areas where pollutant concentrations are expected to be higher, either adjacent to major sources of pollutants or potential problem areas. There are currently no monitoring stations for criteria pollutants in the Kittitas area, and thus ambient concentrations for criteria pollutants are unavailable.

In an attempt to characterize existing ozone and particulate concentrations along the pipeline route, a brief summary of monitored data is included in Tables 3.2-2 and 3.2-3. Table 3.2-2 presents existing concentrations in the Puget Sound area (King and Snohomish counties) and Yakima County. No other ozone monitoring stations exist within the vicinity of the pipeline that are reported by Ecology.

Table 3.2-3 presents particulate data along the pipeline route. Data concerning total suspended particulates are very scarce throughout the state. Puget Sound has recently been reclassified as an attainment area while the Yakima and Wallula areas exceed the ambient standards for PM10. In the Yakima and Tri-cities areas, memorandum of agreements have been issued which state that the areas are out of compliance with the standards, yet have not been designated as nonattainment areas. Along the Columbia Plateau, numerous studies have been initiated to gain a better understanding of wind blown dust and the causes of high concentrations in Eastern Washington.

TABLE 3.2-2
MONITORED OZONE CONCENTRATIONS

Location	Ozone Concentration (ppm)	
Puget Sound	1993	1994
Getchell (Snohomish County)	.093	.082
Lake Sammamish	.098	.107
Klickitat County- Wishram, WA	.071	.092

TABLE 3.2-3
MONITORED PARTICULATE CONCENTRATIONS

	Particulate Concentration (ug/m3)			
	Annual		24-hour	
Location	1993	1994	1993	1994
Puget Sound:				
TSP Bellevue-NWRO	--	20	--	38
TSP Seattle- Harbor Island	--	43	--	129
PM10 Bellevue	20	18	47	45
PM10 Seattle, Harbor Island	23	27	90	60
Kittitas Area- none				
Yakima County- PM10				
Yakima-Garfield	38	31	97	89
Yakima-YVCC	31	27	93	104
Othello	36	26	224	62
Wenatchee	25	31	62	361
Kennewick-Columbia Center	32	25	1166	125
Wallula	38	37	195	173
TSP standard	--	60	--	150
PM10 standard	--	50	--	150

Climate And Meteorology

This subsection presents a qualitative description of the climatic regions associated with the entire pipeline route. The Meteorology subsection discusses the climate and meteorological setting associated with the Kittitas Terminal. This section has been subdivided into two sections in order to differentiate between those areas associated with the entire route, and the required information for dispersion modeling analyses.

Climate Along the Pipeline Route

The climate within Washington can be divided into segments of similar topographic regions. For each topographic region the pipeline traverses general climate conditions are described below. Data for each region is summarized from narratives for representative areas (NCDC, 1995; Franklin and Dyrness, 1973). Figure 3.2-1 presents precipitation isopleths throughout Washington. All references to temperature are presented in degrees Fahrenheit.

Figure 1 Washington precipitation isopleths

Puget Basin

The climate within Puget Basin is mild and moist, the result of the prevailing westerly winds off the Pacific Ocean to the west, and the Cascade Mountains shielding the region from cold air masses from the east. Winters are mild and summers cool because of the steady influx of marine air. The daily temperature range is small and extremes of temperature, both hot and cold, are moderate and usually of short duration. The warmest summers and the coldest winters come with north winds from British Columbia or east winds from eastern Washington. Annually, the summer will have less than three days with a high temperature of 90°F or more with the maximum temperature rarely reaching 100°F. Nighttime temperatures during the warmer months seldom remain above 65°F. Daily highs during the winter fail to rise above 32°F on an average of about two days per year, while the number of days with minimum temperatures of 32°F or less averages only 15 days per year. Low temperatures may vary by several degrees throughout the area and depend upon the wind direction, distance from water, and site elevation.

Puget Basin lies on the lee side of the Olympic Mountains. As a result, normal precipitation averages less than 36". At the foothills of the Cascades an average of 50" of precipitation falls. The western slopes of the Cascades lift the moist marine air, causing very heavy precipitation on the seaward slopes and less at the summits. The winter wet season from October to March is the result of the air flowing around the Aleutian low pressure system. In the summer the Eastern Pacific high pressure system moves north and forces the moist marine air to the north of Washington and brings relatively dry, cool air to the region. Warmest temperatures usually occur when the Pacific high extends into southwest Canada creating a hot and dry flow of continental air across the Cascade Mountains into the Puget Basin. Less than 20 percent of the annual rainfall occurs during the summer season, April through September. The average winter snowfall is about 9", but the snow seldom remains for more than 2 days. Annual snowfall totals from trace to over 36" in one season. Fog frequently occurs during late fall and winter months. Severe weather is infrequent with an average of 6 thunderstorms per year with no tornadoes ever reported.

West Cascades

Climate within the West Cascade region is influenced by terrain features and elevations which make generalization for this area difficult. Precipitation and snowfall increase and temperatures decrease as elevation increases. Figure 3.2-2 graphically presents this event. Precipitation is very high on the western slopes and decreases along the eastern slopes during the winter months. As a result of decreasing temperatures during the winter and combined elevation effects most of the precipitation is in the form of snowfall. Annual snowfall accumulation may reach 600" with ground accumulation of 25' or more. This snowfall may remain throughout the entire year especially in glacial areas.

FIGURE 3.2-2 CLIMATE CROSS SECTION OF THE CASCADE RANGE

Summers in the West Cascades are also variable as depicted from mean July temperatures on Figure 3.2-2. Temperatures average approximately 68°F and may drop below freezing at night. Precipitation during the summer averages about 8 percent of the annual total.

East Cascades

The East Cascades exhibit similar elevation trends as the West Cascades. Temperatures decrease with increased elevation. Precipitation is not as heavy along the East Cascades. A dramatic decrease in annual precipitation is shown on the precipitation isopleths of Figure 3.2-1 and Figure 3.2-2. This is a result of the north-south orientation of the Cascades. This creates an effective barrier between the maritime and continental air mass movements from the east. Precipitation averages 32 to 48" annually, with snowfall averaging 200" per year. Mean temperatures for the region average 10°F during January up to 80°F in July.

Columbia Basin Hills

Topography in the Columbia Basin Hills is complex with a number of minor valleys and ridges giving a local relief of as much as 1,000'. This complex topography results in variations in air drainage, winds, and low temperatures within short distances. The climate of the Columbia Basin Hills is relatively mild and dry. It has characteristics of both maritime and continental climates, modified by the Cascade and the Rocky Mountains, respectively. Summers are dry and rather hot, and winters cool with only light snowfall. The maritime influence is strongest in winter when the prevailing westerlies are the strongest and most steady. The Selkirk and Rocky Mountains in British Columbia and Idaho shield the area from most of the very cold air masses that sweep down from Canada into the Great Plains and eastern United States. Sometimes a strong polar high pressure area over western Canada will occur at the same time that a low pressure area covers the southwestern United States. On these occasions, the cold arctic air will pour through the passes and down the river valleys of British Columbia, bringing very cold temperatures to the Columbia Basin Hills. However, over one-half of the winters remain above zero.

The modifying influence of the Pacific Ocean is much less in summer. Afternoons are hot, but the dry air results in a rapid temperature fall after sunset, and nights are pleasantly cool with summertime low temperatures, usually in the 50°F. Periods of 4 to 11 days of 100°F or more have occurred. Precipitation follows the pattern of a West Coast marine climate with the typical late fall and early winter high. However, since Columbia Basin Hills lies in the rain shadow of the Cascades, total amounts are small. From November to January nearly half of the annual precipitation falls. Late June, July, and August are very dry. Snowfall in the Columbia Basin Hills area is light, averaging 23 to 25".

Summers are sunny, with about 85 percent of the possible sunshine. Winters are generally cloudy, with only a third of the possible sunshine. Winds are mostly light, averaging about 7 mph for the year, being somewhat stronger in late spring and weaker in winter. Speeds of 30 to 35 mph are reached at least once in about half the months and speeds over 40 mph occur in about l out of 5 months. The most common wind direction is from the west in winter and the west-northwest in summer.

Columbia Basin Flat

The moderate climate of the Columbia Basin Flat is due to the prevailing flow of air from over the Pacific Ocean. Cold spells are caused by outbreaks of frigid air from Canada. They are broken by chinooks. Summer hot spells are caused by a northward drift of warm dry air. Most summers have about 4 days with temperatures of 100°F or higher. Hot spells are broken by a flow of air from over the ocean. Annual precipitation over the Flat usually ranges between 11 and 20". Precipitation is quite light because the prevailing flow of air from over the ocean loses much of its moisture while crossing the Cascade Mountains. Terrain effects on most elements of local weather are frequently greater than those associated with migratory weather systems.

Ice storms, also called silver thaws, are infrequent, but they occasionally cause hazardous conditions and some damage. Hail is quite infrequent over the lower elevations. It is more likely to fall over the higher elevations. A few tornadoes, generally small-bore funnel clouds which touch the ground briefly have been observed over the area. The most likely season is in April, May, and June but they may occur in any month. Winds are generally quite light but occasional windstorms and dust storms may be expected. Periods of air stagnation also occur. Flash floods are rare but significant events. They are caused by cloudbursts from thunderstorm clouds mostly over the higher elevations in late spring and summer. Slow rising floods in small streams are generally preceded by snow pack on frozen ground followed by chinook winds and rains. Highest humidity is generally during periods of fog in late fall and winter. Lowest humidity usually occurs on hot summer afternoons.

The previous subsection describes climate scenarios in designated areas of the proposed pipeline route. The Kittitas Terminal is located within the designated area referred to as the Columbia Basin Flat. This area has an arid to semiarid climate with little precipitation, warm, sunny summer days, and relatively cold winters. The average annual temperature for the region, based on climatological data for Yakima, Washington, equals 50°F (9.9°C) (Franklin and Dyrness, 1973). Average January and July temperatures equal 27.5°F (-2.5°C) and 71°F (21.7°C), respectively. In this region, the Cascade Mountains create an orographic barrier against the maritime climates to the west of the Cascades, and the Columbia River Basin is generally very dry as a result of air masses being diverted downward, compressed, and warmed--thus inhibiting precipitation.

The National Climatic Data Center (NCDC) does not publish meteorological data for the Kittitas area. Representative meteorological data used for dispersion modeling was purchased from NCDC. Hourly meteorological surface data was collected at station # 24220, Bowers Field, in Ellensburg, Washington up to the year 1954. Five years of surface data were purchased for the years 1950 through 1954. This data was compiled with upper air data collected in Spokane for the corresponding time period to calculate a five-year annual average suitable for modeling. NCDC compiled this data into a 16 directional joint frequency format using EPA's approved STAR program. This data was used for dispersion modeling using ISCLT3. Table 3.2-4 presents a summary of the STAR data for the Ellensburg area.

TABLE 3.2-4
WIND FREQUENCY DISTRIBUTION FOR ELLENSBURG, WASHINGTON

Direction	Speed (Knots)							
	0-3	**4-6**	**7-10**	**11-16**	**17-21**	**>21**	**%**	**Avg Spd.**
N	.015406	.007855	.003516	.000525	.000023	.000000	2.732500	5.1
NNE	.008204	.005959	.003265	.001164	.000068	.000046	1.870600	6.1
NE	.036624	.022102	.010458	.001301	.000091	.000023	7.059900	5.3
ENE	.024562	.017353	.010343	.001370	.000297	.000160	5.408500	5.9
E	.048862	.031053	.016120	.003539	.000365	.000068	10.000700	5.6
ESE	.018823	.011576	.007603	.002283	.000046	.000023	4.035400	6.0
SE	.028895	.015093	.006987	.001758	.000068	.000000	5.280100	5.2
SSE	.018019	.010001	.004795	.001438	.000046	.000000	3.429900	5.5
S	.023574	.011394	.004658	.001347	.000365	.000091	4.142900	5.3
SSW	.009087	.005115	.001735	.000320	.000114	.000000	1.637100	5.1
SW	.015572	.006690	.002078	.000502	.000023	.000000	2.486500	4.7
WSW	.007336	.004064	.001667	.000342	.000023	.000023	1.345500	5.2
W	.017740	.009704	.006142	.002238	.000320	.000525	3.666900	6.5
WNW	.018105	.011987	.019591	.036739	.032400	.060142	17.896400	17.8
NW	.023196	.013883	.023632	.067107	.057060	.064823	24.970100	16.8
NNW	.012897	.007101	.005982	.008357	.004224	.001781	4.034200	10.5
Average Annual Speed								6.9

As shown in the table, prevailing wind directions are from the wet-northwest and northwest directions approximately 43% of the time. Annual average speed for the Kittitas-Ellensburg area equals 7 knots (8 mph).

The disperion modeling also requires the use of mixing height data. A summary of representative mixing height data for the Kittitas area is presented in Table 3.2-5. These data were derived from EPA isopleths developed by Holzworth (USEPA, 1972).

TABLE 3.2-5
MIXING HEIGHTS AND WIND SPEEDS FOR KITTITAS, WASHINGTON AREA

	Winter		Spring		Summer		Autumn		Annual	
Kittitas Area	**Mixing Height (m)**	**Wind Speed (m/s)**	**Mixing Height (m)**	**Wind Speed (m/s)**	**Mixing Height (m)**	**Wind Speed (m/s)**	**Mixing Height (m)**	**Wind Speed (m/s)**	**Mixing Height (m)**	**Wind Speed (m/s)**
Morning	400	5	600	5	400	4	400	4	500	5
Afternoon	400	5	1800	6	2000	5	1200	5	1300	5

Mixing height parameters used as input into the model were developed from the above table based on recommendations specified in the ISCLT3 user's guide.

Temperatures used in the ISCLT3 model were based on the recommendations provided in the user's guide. The annual average daily maximum and minimum temperatures as recorded from the 1994 Local Climatalogical Data - Annual Summary for Yakima, Washington was used for the model input parameters. The normal temperatures are as follows:

- Average Daily Maximum: 62.8°F
- Average Daily Minimum: 36.96°F
- Annual Average: 49.8°F

Estimated Pollutant Emissions

The following subsection presents emission estimates of criteria pollutants associated with the project's Kittitas Terminal and the pump stations. Construction emissions and operational emissions are estimated for each source type. Due to the nature of the operations at each of the source types (storage and loading of fuels), total VOCs are the primary pollutant of concern; however, toxic emissions are also estimated and compared to Ecology's ASILs. Pumping and metering equipment at the pump stations and the Kittitas Terminal are operated by electricity, therefore other pollutant emissions would be insignificant. However, the Kittitas Terminal will include a diesel-operated firewater pump. This pump will be used for emergency only but must be periodically tested to insure operation. A discussion of construction emissions along the pipeline route is also included in this subsection.

Kittitas Terminal

Construction Emissions

There is currently no specific information available to estimate construction emissions of the Kittitas storage and distribution facility; however, fugitive dust calculations can be estimated based on the number of acres of land for the site. The equation below, provided by EPA (USEPA, 1995) predicts fugitive dust emission during heavy construction:

E = 1.2 tons/acre/month

Assuming the entire site (22 27 acres) is disturbed for one full month of construction, fugitive dust emissions are estimated at 26.4 32.4 tons of particulate matter smaller than 10 microns. Assuming that construction and ground disturbance did not extend past the estimated month, the annual emissions would be the same. Emissions from construction would be reduced by water suppression methods, which can yield a 50 percent decrease in fugitive emissions, thus reducing the emissions to 13.2 tons per month.

Operational Emissions

Firewater Pump Emissions

The firewater pump will be operated one half hour per week as mandated by fire safety codes. This pump utilizes a diesel operated internal combustion engine rated at 200 horsepower. Emission factors from AP-42 Supplement B with a D-rating were used to calculate potential emissions from this source. The emission factors and corresponding emissions are presented in Table 3.2-6. Because the firewater pump is operational only 26 hours per year, and emission are less than 1 ton per year for all criteria pollutants, this source is considered an insignificant source and is not included in the operational emissions inventory of the Kittitas Terminal. The remaining discussion focuses on the storage and loading operations at the terminal.

TABLE 3.2-6
POLLUTANT EMISSIONS RESULTING FROM THE FIRE PUMP IC ENGINE AT THE KITTITAS FACILITY

Pollutant	Emission Factora (lb/hp-hr)	Hourly Emission Rateb (lb/hr)	Annual Emission Rate c (lb/yr)	Annual Emissions (tons/yr)
NOx	0.031	3.1	161.20	0.08
TOC -Exhaust	2.47E-03	0.247	12.84	0.01
TOC-Crancase	4.41E-05	0.00441	0.23	0.00
TOC Total	**	0.25141	13.07	0.01
CO	6.68E-03	0.668	34.74	0.02
PM10	2.20E-03	0.22	11.44	0.01
SOx	2.50E-03	0.25	13.00	0.01
Benzene	9.33E-04	0.0933	4.85	0.00

a Emission factors are presented in AP-42, Supplement B, Section 3.3 for diesel-powered IC engines.
b Hourly emission rates are based on the hourly usage for the emergency fire pump operation: 0.5 hr per week. (200 horse-power)
c Annual emission rates are based on 0.5 hr per week for 52 weeks. (26 hours per year)

Maximum Potential to Emit

Sources of operational emissions from the Kittitas Terminal are: (1) bulk storage tanks; (2) dispensing of fuel from the storage tank to tanker trucks (truck loading losses); and (3) fugitive emissions from pipeline valves, flanges, and pump seals throughout the facility. Figure 3.2-3 presents the layout of the Kittitas Terminal depicting an assigned tank number which corresponds to all tables in this section.

Figure 3 Kittitas Terminal Layout

The maximum potential to emit pollutants at the Kittitas Terminal is based on throughput volumes. The first considerations the maximum design capacity of the pipeline to deliver product to the storage facility. The second consideration deals with the maximum throughput of product loaded at the transfer rack.

Storage Tanks

The design capacity of the pipeline was determined by OPL as the maximum pumping and transporting capacity of fuels along the pipeline route. The design considered the ability of the pipeline to carry liquids within a 14" pipe through metering and pumping equipment into the storage facility. this capacity equals 7200 barrels per hour, or 172,800 barrels per day for 365 days per year. The pipeline is also designed to bypass the storage equipment completely.

The storage design of the terminal was based on the types of products in demand and the quantity of this demand. The demand for product type was based on historical records and professional experience for fuel product demand. The percentage of fuel type to be transported and stored is therefore assumed to be the following:

subgrade gasoline 20.1%
regular gasoline 20.1%
premium gasoline 19.8%
low sulfur diesel 18%
high sulfur diesel 22%.

Jet turbine fuel may be delivered to storage via the pipeline. At the present time there is no demand for jet fuel explaining its exclusion from the above list. If jet fuel is eventually transported in the pipeline to storage, as expected, the jet fuel throughput will displace and offset diesel or gasoline throughput, both which emit greater amounts of VOCs.

An additional consideration in storage capacity design is the use of storage tanks themselves. It is anticipated that each tank will operate on a 6-day turnover cycle. This scenario allow for a maximum of 60 turnovers per year for each tank.

If the storage facility accepted the maximum throughput rate of the pipeline, tanks would require more than 60 turnovers annually, which is not feasible for the use of the tanks. Therefore, the capacity of the storage facility is limited to a determined throughput volume into the storage facility. This value is easily recorded due to the metering equipment at the facility.

If the storage facility receives 108,600 barrels per day, assuming the demand for product is as stated, gasoline and diesel tanks would turnover nearly 60 turnovers annually. OPL will accept permit restriction concerning the throughput of fuel into the storage facility as 39,639,000 barrels per year. A yearly restriction is suggested as VOC emissions determine benzene concentrations which is regulated on an annual basis. Table 3.2-7 presents the maximum operating scenario for the Kittitas Terminal.

Further analysis of the storage tank design suggests additional limitations. VOC content of each product at the facility ranges from very small amounts (diesel and jet fuel) to large amounts emitted by gasoline products. Gasoline products are segregated by grade, and differ by seasonal blend. Summer and winter blend volatility is restricted by federal regulation 40 CFR 80 - Regulations of Fuel and Fuel Addititives). In Washington, blends, differentiated by Reid Vapor Pressure, cannot exceed 9.0 RVP in the summer (10 if ethanol blends are used). The regulated period is May 1 through September 15. The state can also regulate RVP but cannot be less stringent than federal regulations. OPL is regulated not only by statute but also by tariff agreement. The maximum RVP values according to tariff agreement are presented in Table 3.2-8 for each month. The emission inventory is calculated using fuels with RVP10 and RVP13, representing summer and winter blends respectively.

TABLE 3.2-7

MAXIMUM PROJECTED OPERATING SCENARIOS - CROSSCASCADES PIPELINE- SPRING 1997

Based on projected 30-year growth factor (2% per year for 30 years)

Pipeline capacity = 60,000 barrels/day for 365 days/year; 60000 bl/day * 365 days/yr * 1.81 = 39,639,000 barrels/year; 108,600 barrels/day; 1,664,838,000 gal/yr; 4,561,200 gal/day

Storage Tank Capacities: Based on 30-yr demand plan

Tank #	Liquid Stored	Volume (1000 bls)	Volume (gal)1	% tl 2	Annual Net Throughput (gal/yr)3	Annual Turnover Rate	Monthly Throughput - Summer 5	Monthly Throughput - Winter	Shell Height ft	Shell Diameter ft
1	transmix	10	420,000	na	3,346,324	7.97	301,169	256,552	40	50
2	ethanol	10	420,000	na	420,000	1	35,000	35,000	40	50
3	premium gas	125	5,250,000	19.8	329,637,924	62.79	29,667,413	25,272,241	48	150
4	regular/sub gas	90	3,780,000	13.4	223,088,292	59.02	20,077,946	17,103,436	48	128
5	regular/sub gas	90	3,780,000	13.4	223,088,292	59.02	20,077,946	17,103,436	48	128
6	regular/sub gas	90	3,780,000	13.4	223,088,292	59.02	20,077,946	17,103,436	48	128
7	high sulfur diesel	90	3,780,000	11	183,132,180	48.45	15,261,015	15,261,015	48	128
8	high sulfur diesel	80	3,360,000	11	183,132,180	54.50	15,261,015	15,261,015	48	120
9	low sulfur diesel	115	4,830,000	18	295,890,840	61.26	24,657,570	24,657,570	48	145
10	jet turbine fuel4	90	3,780,000	na	3,780,000	1	315,000	315,000	48	128
Sum		770	32,340,000	100	1,664,838,000					

1 - One barrel = 42 gallons

2 - Demand plan of 40.2% subgrade/ reg; 19.8% premium;18% low sulfur; 22% hi sulfur; % transmix = 1/2 of 1% of the volume of sub/reg; ethanol 1 tank capacity.

3 - Throughput = total pipeline gallons * % tl; ethanol is loaded from the auxiliary loading rack; transmix is either sent via pipeline or unloaded into tankers at the auxilliary rack.

4 - Jet A fuel may be delivered to storage via the pipeline. If delivered the volume stored will displace volume from either gas or deisel, both which emit higher VOCs. For air permitting purposes, the jet turbine tank will assume 1 turnover, to account for VOCs from the tank, and annual throughput will be subtracted from lost diesel fuel throughput.

5 - Seasonal variability of gasoline is based on 1995 monthly sales data from OPL Summer (April-Sept)=54%, winter = 46% of total sales. Applies to gasoline only.

Transfer Rack*

2 - 10,000gal trucks every 20 mins for 17 hours/day 365 days/yr = 372,300,000 gal/yr; 1,020,000 gal/day; 102 trucks/day
* Auxilliary rack is negligible based on content and use

TABLE 3.2-8
REID VAPOR PRESSURE PROFILE

Profile is based on tariff agreement with Texaco.
Regulated season is March 1 through September 15

Month	Tariff RVP Value	RVP Applied in Modeling
January	15.0	13
February	15.0	13
March	13.5	13
April	11.5	13
May	9.0	10
June	9.0	10
July	9.0	10
August	9.0	10
September	11.5	13
October	13.5	13
November	13.5	13
December	15.0	13

Because summer and winter blend volatilities differ, and because each corresponding blend has different benzene content, demand for gasoline products were further investigated. According to historical data and professional experience, demand for gasoline is greater in the summer months (April to September) than during winter months (October through March). This is consistent with analyses presented in the gas MACT background document which states that summer gasoline sales equate to greater than 60% of annual sales. OPL has provided regional sales data for 1995 by month for gasoline and diesel fuel. These values are presented in Table 3.2-9 and depicted graphically in Figure 3.2-4.

FIGURE 3.2-4 - SEASONAL FUEL

TABLE 3.2-9
FUEL SEASONAL USAGE PROFILE - WASHINGTON

Month	Gas (bl)	Average	Relative to avg	% of Tl	Fuel (bl)	Average	Relative to avg	% of Tl
Jan	5,498,459	5,715,330	0.96	8%	3,905,342	3,658,467	1.07	9%
Feb	4,872,183	5,715,330	0.85	7%	3,576,085	3,658,467	0.98	8%
Mar	5,569,462	5,715,330	0.97	8%	3,941,506	3,658,467	1.08	9%
April	5,993,643	5,715,330	1.05	9%	3,573,966	3,658,467	0.98	8%
May	6,399,699	5,715,330	1.12	9%	3,542,891	3,658,467	0.97	8%
June	6,057,243	5,715,330	1.06	9%	3,691,645	3,658,467	1.01	8%
July	6,184,378	5,715,330	1.08	9%	3,801,528	3,658,467	1.04	9%
Aug	6,049,969	5,715,330	1.06	9%	4,055,529	3,658,467	1.11	9%
Sept	6,131,495	5,715,330	1.07	9%	3,553,301	3,658,467	0.97	8%
Oct	6,040,978	5,715,330	1.06	9%	3,848,910	3,658,467	1.05	9%
Nov	4,994,644	5,715,330	0.87	7%	3,353,831	3,658,467	0.92	8%
Dec	4,791,808	5,715,330	0.84	7%	3,057,065	3,658,467	0.84	7%
Total	68,583,961			100%	43,901,599			100%
Average	5,715,330				3,658,467			

Based on Texaco Sales Data - 1995 within this region

The annual average gasoline sales is less than the values for the summer months, and higher than those for winter months. For this analysis, October is not considered a summer month, even though monthly sales are above annual monthly values. Sales during summer months equal 54% of total sales while winter months equal 46% of total sales. Diesel fuel does not appear to vary by season.

Based on this information, monthly throughput for gasoline tanks are calculated by season-summer and winter, according to each blend type. Table 3.2-7 reflects this assumption for each tank by multiplying annual net throughput by seasonal variability. The seasonal monthly throughput equals the percentage of net throughput assumed for seasonal demand divided by the number of months in the seasons. For example, the summer monthly throughput equals the net throughput multiplied by .54, divided by 6.

The intent of this scenario is to account for emissions from both fuel blends at the terminal. OPL will monitor and record seasonal blend quantities and include the predicted emissions of VOCs and benzene by blend in the 12-month consecutive running total to demonstrate compliance with permit limits.

Loading Rack

The maximum potential of the transfer loading rack is also based on a limiting value. OPL will restrict daily throughput of fuel dispensed at the loading rack. The limitation is based on the premise that two main transfer bays are present at the facility. Two tanker trucks with a carrying capacity of 10,000 gallons can load product simultaneously taking 20 minutes per loading operation. The remaining loading bay is an auxiliary rack reserved solely for the use of unloading ethanol into the storage facility, and possibly loading of transmix into tanker trucks. The annual amount of transmix is relatively small, as most transmix is put back into the pipeline system for product recovery. However, if the transmix volumes are enough to where dilution into the system is not able to keep up with the receipt of transmix into storage, the transmix may be off-loaded into tanker trucks and transported to a refinery. For this reason, the auxiliary rack is not considered as part of the emission inventory as far as daily or annual throughput. However, fugitive emissions from the auxiliary rack are included in the fugitive emissions calculations. With this in mind, the maximum number of trucks to load product equals 6 trucks per hour. This operation is anticipated as a 24-hour operation with the majority of loading occurring during the early morning and daylight hours. However, the likelihood of the transfer rack operating at full capacity is very unlikely. Based on professional experience, OPL wishes to limit daily throughput for the purposes of this permit to 1,020,000 gallons per day with an annual throughput of 373,300,000 gallons per year. This is equivalent to 102 10,000 gallon trucks loading product throughout a 24-hour period.

In order to differentiate demand for gasoline blends, the same premise was used as for the storage tanks: product demand for gasoline is greater in summer than in the winter, and gasoline blends differentiate between respective RVP values for each season.

A discussion concerning the type of control equipment associated with the pollutant sources follows. The determination of what constitutes BACT is essential prior to presenting a discussion on predicted facility emissions.

BACT Determination

WAC 173-400-030 applies to any increase in emissions that the new source or modification would cause. Accordingly, the BACT analysis is included to demonstrate that the proposed facility will utilize emission controls that are consistent with Washington’s BACT requirements

Note that the State’s air quality regulations do not specifically require that a BACT determination be presented according to the “top-down” method that has been a component of USEPA policy for PSD projects since 1987. Nevertheless, the Department of Ecology has also adopted the top-down approach as a policy matter, and the present analysis has been conducted accordingly. This explains why federal guidance documents intended for PSD permitting applications are cited throughout the following discussion, even though the federal PSD program itself does not apply to the Kittitas project.

The top-down process for determining BACT provides that all available control technologies for a particular emission source be ranked in descending order of control effectiveness, with the most stringent or "top" alternative considered first and discarded only if it can be demonstrated that technical considerations, or energy, environmental or economic impacts justify a finding that this control option is infeasible. If the most stringent technology is eliminated based on one or more of these criteria, then the next most stringent alternative is considered, and so on, until a feasible technology is identified. The five basic steps for implementing the top-down process for a particular emission unit are listed below

(1) Identify all available control technologies.

(2) Eliminate technically infeasible alternatives.

(3) Rank remaining control technologies by control effectiveness.

(4) Evaluate remaining controls in terms of the energy, environmental and economic impacts, both beneficial and adverse.

(5) Select BACT as the most effective control option not eliminated due to the considerations in the previous steps.

The only criteria pollutant that will be emitted by the Kittitas terminal in appreciable quantities is volatile organic compounds (VOCs). This pollutant is of regulatory concern primarily because of its role in the atmospheric formation of ozone. There are three categories of VOC sources at the proposed facility: storage tanks, truck rack and general fugitive emissions due to leaks from valves, flanges, pump seals, etc. The following subsections provide the BACT demonstrations for each category of sources. The only source of other pollutants will be an emergency firewater pump that will operate on diesel fuel. However, this piece of equipment will be tested only about one-half hour per week to ensure its operability, and the associated emissions of combustion pollutants (NO_x, SO_2, CO and PM_{10}) are not subject to BACT requirements.

The control technology option proposed as BACT for VOC emissions from the storage tanks at Kittitas is the internal floating roof with double seals (vapor mounted). This option has a VOC emission reduction rating that is slightly less than that of the same tank configuration with liquid mounted seals, but does not entail creation and disposal of a hazardous waste, i.e., the saturated seal material, which is the primary reason for OPL's preference of the vapor-mounted seal option. OPL will agree to permit conditions specifying the installation of the proposed controls on all storage tanks at the Kittitas facility, as well as the associated maintenance and recordkeeping requirements that are specified in 40 CFR 60 Subpart Kb.

The proposed Kittitas facility will include a loading rack capable of simultaneous loading two tanker trucks with a design fuel transfer rate of 1,440,000 gallons per day. The proposed design of the truck rack includes a provision for the use of vapor recovery with a high efficiency carbon adsorption system to reduce emissions of VOC to the atmosphere by at least 99.9%. This level of control more than satisfies the requirement to limit emissions to no more than 10 mg per liter of gasoline loaded, which is stipulated by the new MACT (NESHAP) standard for this source category (40 CFR 63 Subpart R). The calculated emission rate of the facility in these units is 1 mg/liter of liquid loaded despite the fact that, as a non-major source of hazardous pollutants as defined in 40 CFR 63 Subpart A, the Kittitas facility is not required by federal regulations to meet the 10 mg/liter limit. However, the facility is subject to the VOC control New Source Performance Standards of 40 CFR 60 Subpart XX.

Vapor recovery and carbon adsorption with a 99.9% level of VOC control is considered to be the “top” level of emission control available for this equipment. No truck loading facility included in the EPA BACT/LAER Clearinghouse data base was required to install a more stringent level of control. In fact the MACT standard, which the proposed control equipment will easily surpass, was selected by EPA expressly on the basis of representing the top 10% of control efficiencies for similar equipment nationwide. Since top-BACT is proposed, a full top-down evaluation of alternate systems is not required. OPL will commit to the use of the proposed carbon adsorption system, and will accept permit conditions specifying this level of control, including the associated maintenance and recordkeeping requirements, as specified in 40 CFR 60 Subpart XX.

Fugitive emissions of VOC will result from leaking valves, flanges, compressor seals and other components throughout the proposed Kittitas facility. The only feasible control option for this source is an inspection and maintenance program to identify and repair leaking components on a routine basis. OPL will agree to permit conditions requiring implementation of the monitoring, recordkeeping and reporting procedures listed in 40 CFR 61 Subpart V. This NESHAP requires that pump seals be inspected weekly and monitored if, upon visual inspection, a leak is detected. Maintenance and repair must be performed within 15 calendar days. Valves must also be monitored monthly and repaired within 15 days if a leak is detected. A leak is defined as 10,000 ppm above background. If a leak is detected by visual or olfactory means at a connector or flange then the device must be monitored within 5 calendar days and repaired within 15 calendar days. OPL will submit an I&M plan including compliance methods stating that monthly visual observation will be utilized at the Kittitas Terminal. This type of program is considered the top level of control feasible for fugitive VOC emissions at the Kittitas facility, and is consistent with the most stringent previous BACT findings for similar facilities. Accordingly, a detailed top-down control technology evaluation of alternate controls for fugitive VOC emissions is not required. A detailed BACT analysis is included in Section 6.1.

Storage Tanks

Storage tanks containing volatile liquids such as petroleum products exhibit losses during storage due to evaporation of the liquid (standing losses) and losses as a result of changes in liquid levels (working losses).

Standing losses in tanks with internal floating roofs occur mainly as a result of improper fit between the deck seal and the wall of the tank. These seals slide against the tank wall as the deck is raised or lowered. Other penetrations in the deck, such as gauge attachments, access hatches, ladder wells, and column wells also contribute to standing losses of VOCs from storage tanks. These standing losses will be minimized through the use of primary and secondary deck seals, as required under 40 CFR Part 60, Subpart Kb and inspection of the storage tank equipment.

Working losses occur mainly due to residual liquid on the tank wall or support column during lowering of the liquid levels. The design of an internal floating roof with an external fixed roof reduces evaporative emissions due to wind loss. Pressure vents set at atmospheric pressure prevent the accumulation of vapors from approaching the flammable range.

For this project, the emission estimation procedures used for calculating VOC storage tank losses included the use of a software program entitled TANKS3, available through the EPA. This software incorporates the estimating procedures outlined by EPA (USEPA, 1995). Assumptions made regarding the input parameters include the following:

- Default meteorology for Yakima, Washington, was used for the model.
- The annual throughput of ethanol was based on the single tank being unloaded at equal rates throughout the entire year.
- Jet fuel (kerosene) annual throughput was estimated as one tank turnovers, although the demand for jet fuel is not expected for several years. This will account for standing losses from a jet fuel tank.
- The contents of the transmix tank were assumed to consist only of gasoline, the worst-case scenario. In addition, the annual throughput of the tank was calculated as one-half of one percent of the total throughput of the combined regular and subgrade gasoline volumes stored at the facility.
- RVP values for summer and winter blend gasolines are 10 and 13 respectively.
- Throughput is entered monthly based on seasonal demand. The monthly values are presented in Table 3.2-7.

Total VOC losses for each tank using the TANKS3 model are presented in Table 3.2-10. For each tank the table presents the sum of total VOCs emitted per tank per month for the tank facility. Predicted emissions of approximately 14.22 tons per year of total VOCs are estimated from storage tank losses. Model output files are included in Appendix D.

TABLE 3.2-10
TOTAL VOC EMISSIONS FROM STORAGE TANKS- OPL

TANK	JAN	FEB	MAR	APR	MAY*	JUNE*	JULY*	AUG*	SEPT	OCT	NOV	DEC	TOTAL
1	157.15	172.89	187.01	205.97	167.89	182.21	195.33	189.11	234.00	202.54	175.61	162.51	2,232.22
2	7.07	8.14	9.13	10.48	12.15	13.67	15.10	14.42	12.53	10.24	8.33	7.43	128.69
3	504.09	551.89	594.78	657.04	542.68	586.16	626.01	607.11	742.14	641.94	560.16	520.39	7,134.39
4	419.48	459.37	495.17	546.92	451.43	487.71	520.97	505.19	617.93	534.52	466.27	433.09	5,938.05
5	419.48	459.37	495.17	546.92	451.43	487.71	520.97	505.19	617.93	534.52	466.27	433.09	5,938.05
6	419.48	459.37	495.17	546.92	451.43	487.71	520.97	505.19	617.93	534.52	466.27	433.09	5,938.05
7	26.52	26.59	26.66	26.75	26.86	26.96	27.05	27.01	26.88	26.73	26.61	26.55	321.17
8	28.11	28.17	28.23	28.31	28.41	28.51	28.59	28.55	28.44	28.30	28.18	28.13	339.93
9	37.68	37.76	37.84	37.94	38.07	38.18	38.29	38.24	38.10	37.92	37.78	37.71	455.51
10	1.17	1.26	1.34	1.46	1.60	1.72	1.84	1.78	1.63	1.44	1.27	1.20	17.71
TOTALS	2,020.23	2,204.81	2,370.50	2,608.71	2,171.95	2,340.54	2,495.12	2,421.79	2,937.51	2,552.67	2,236.75	2,083.19	28,443.77.77
TPY													14.22

* Months using summer blend RVP10

TABLE 3.2-10 (CONTINUED)
TOTAL VOC EMISSIONS FROM STORAGE TANKS - OPL

TANK	JAN	FEB	MAR	APR	MAY*	JUNE*	JULY*	AUG*	SEPT	OCT	NOV	DEC	TOTAL
1	157.15	172.89	187.01	205.97	167.89	182.21	195.33	189.11	234.00	202.54	175.61	162.51	2,232.22
	Summer Blend =		734.54	(May through August)									
	Winter Blend =		1,497.68	(all remaining months)									
	TL =		2,232.22										
3	504.09	551.89	594.78	657.04	542.68	586.16	626.01	607.11	742.14	641.94	560.16	520.39	7,134.39
	Summer Blend =		2,361.96										
	Winter Blend =		4,772.43										
	TL =		7,134.39										
4-6	419.48	459.37	495.17	546.92	451.43	487.71	520.97	505.19	617.93	534.52	466.27	433.09	5,938.05
	Summer Blend =		1,965.30										
	Winter Blend =		3,972.75										
	TL =		5,938.05										

Tank Truck Loading Losses

Dispensing fuel from the storage tank into tanker trucks at the main loading rack results in potential losses of VOCs at many locations. The method of loading to be utilized at this facility is bottom-filled, submerged loading with dry coupling attachments at the product-loading arms. This method is considered to be the most effective means to reduce VOC losses during loading. The tanker truck is filled from the bottom of the tanker with the arm submerged below the liquid level. Dry-break couplings on the loading arms virtually eliminate product spills and vapor emissions when decoupling the arms from the trucks. Product cannot be loaded until all safety and vapor recovery equipment are properly affixed to the truck. The vapor recovery system consists of a vapor recovery unit and processing of displaced vapors from the truck tank. Leaks from tank trucks are virtually eliminated using vapor-tight tank trucks. Therefore, tank trucks are required to be leak-checked and verified to be vapor-tight. Estimates of VOC losses due to tank truck loading were calculated using AP-42 emission factor equations provided by the EPA (USEPA, 1995):

$$L_l = 12.46 \times [(S*P*M) / T]$$ where:

L_l = loss of VOCs per 1000 gallons of liquid loaded
S = Saturation factor of the liquid based on loading process
P = true vapor pressure of liquid loaded, pounds per square inch (psia)
M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole)
T = temperature of bulk liquid loaded, °R = (°F + 460)

Assumptions regarding the loading losses included the following:

- The only fuels to be loaded into tank trucks at the main racks were gasoline and diesel fuels.
- Maximum throughput of the loading rack is 372,300,000 gallons per year.
- True vapor pressure, molecular weight, and bulk temperature were extracted from the output of TANKS3 files for the appropriate fuels. Average values were calculated using monthly values from TANKS used for each season.
- Four months (May through August) utilize RVP10 and 8 months use RVP13.
- The breakdown of fuel dispensed at the loading rack was calculated on the equivalent demand percentages used to calculate the annual volume of stored liquids from the pipeline into the storage tanks (60 percent gasoline fuels and 40 percent diesel).
- Summer blend equals 36% of total net throughput. (4 months * 9%) relative to total net throughput in Table 3.2-7.

Employment of a 99.9 percent efficient vapor recovery system would reduce uncontrolled, estimated total VOC losses from 907 tons per year to 0.91 tons per year. Controlled emissions assume the vapor recovery system and all control measures required by the NSPS are utilized and working properly. Fugitive emissions from VOC losses due to leaks in the loading arm flanges, pumps, and valves are included with the fugitive emission estimates for the facility. Table 3.2-11 presents the results of the truck loading operations.

TABLE 3.2-11

TRUCK LOADING RACK VOC EMISSIONS-OPL

Liquid Loaded	Throughput[1] (gal/yr)	Saturation Factor[2]	Molecular Weight (lb/lb-mole)	True Vapor Pressure[3] (psia)	Temperature of Liquid[3] (Rankin)	VOC Losses[4] (lb/1000 gal loaded)	Total VOC Losses (lb/yr)	99.9% Efficiency
Gas-RVP 10	80,416,800	1.0	66	5.0349	519.38	7.9720	641,083.19	641.08
Gas-RVP 13	142,963,200	1.0	62	5.3755	507.45	8.1834	1,169,929.26	1,169.93
Diesel	148,920,000	1.0	130	0.005	511.43	0.0158	2,358.30	2.36
Total	372,300,000						1,813,370.75	1,813.37

Percent Reduction by Carbon Adsorption Unit = 99% 18,133.71 lb/yr
0.91 tons/yr

1 Throughput of the loading racks is based on 102 - 10,000 gal trucks loading per day for 17 hours, 365 days/year. A ratio of 60 % gas/40% diesel was assumed for the loading of gas and diesel. Gas was further broken down by blend usage. (summer blend 36% of total).

2 Saturation factor is based on the use of dedicated vapor -balanced tanker trucks

3 True vapor pressure and liquid surface temperatures are provided in the TANKS3 outputs. Averages were calculated for each b lend and seasonal useage. RVP 10 is based on months May -Aug, while RVP 13 (winter) is based on the remaining months.

4 Total VOC losses are calculated using L=12.46[(S*M*P)]/T from EPA's AP -42 section 5.2.

Will 99.9% efficinecy meet 10 mg/l emission control standard?

VOCs based on 10 mg/l liquid loaded:

Total loaded:

372,300,000 gallons

gas = 60%	223,380,000 rvp10 (36%)	80,416,800
	rvp13 (64%)	142,963,200
disel = 40%		148,920,000
		372,300,000

1,409,304,420 liters loaded

Then: 10 mg/l loaded 14,093,044,200 mg/ controlled

31,070 lb controlled

15.53 tpy emissions

Fugitive Emissions

Fugitive emissions resulting from leaks in the pipeline valves, flanges, and pump seals were estimated using guidance provided by the EPA (USEPA, 1996). Emissions were calculated using the following equation:

$$\mathbf{VOC = EF_{avg} \; x \; WT_f * N_{equip} \; x \;\; Hr/yr}$$

where:

VOC = VOC emissions in kilograms (kg) per year per equipment in gas stream type.
EF_{avg} = Average emission factor per equipment type (kg/hr/source).
Wt_f = Weight fraction of VOC in the gas stream.
N_{equip} = The number of pieces of equipment per type in the stream.
Hr/yr = The total number of hours of operation per year.

This calculation assumes the VOC weight fraction of the gas equals 1. Emission factors which were presented in the gas MACT background document were selected. Table 3.2-12 presents the breakdown of equipment planned at the terminal facility grouped by activity, emission factors used, total VOCs per activity, and facility total fugitive VOC emissions. Total VOC emissions due to leaks are estimated at 4.02 tons per year. According to the Emission Inventory Improvement Program (EIIP) control efficiency for LDAR programs has been established in the document (EIIP,1996). Emissions from pump seals, and valves using quarterly monitoring methods can reduced by the percentages stated in Table 3.2-12. This percent control reduces VOC emissions to 1.49 tons per year annually. OPL will implement an LDAR program as required in 40 CFR 63 Subpart V.

TABLE 3.2-12

FUGITIVE EMISSIONS FROM EQUIPMENT LEAKS - KITTITAS TERMINAL

Mainline Pumps									
Equipment Type	**Type of Service**	**Equipment Count**	**Hours of operation**	**Weight fraction /1/**	**Emission factor /2/ (kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**	**Control effectiveness applied**	**Controlled VOC emissions (lb\yr)**
Pump Seals	LL	2	8760	1.00	0.00054	9.46	20.91	45%	11.50
Pipeline Valves	LL	13	8760	1.00	0.000043	4.90	10.82	61%	4.22
Flanges	LL	53	8760	1.00	0.000008	3.71	8.21	0%	8.21
TOTAL VOC EMISSIONS							**39.94**		**23.93**
Loading Rack									
Equipment type	**Type of Service**	**Equipment Count**	**Hours of operation**	**Weight fraction /1/**	**Emission factor /2/ (kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**	**Control effectiveness applied**	**Controlled VOC emissions (lb\yr)**
Pump Seals	LL	1	8760	1.00	0.00054	4.73	10.45	45%	5.75
Pump Seals	LL-E	1	8760	1.00	0.00054	4.73	10.45	45%	5.75
Pipeline Valves	V	13	8760	1.00	0.000013	1.48	3.27	70%	0.98
Pipeline Valves	LL	138	8760	1.00	0.000043	51.98	114.88	61%	44.80
Pipeline Valves	LL-E	55	8760	1.00	0.000043	20.72	45.79	61%	17.86
Pipeline Valves	HL	64	8760	1.00	0.000043	24.11	53.28	61%	20.78
LoadArm Valves	LL	14	8760	1.00	0.000043	5.27	11.65	61%	4.55
Flanges	V	25	8760	1.00	0.000042	9.20	20.33	0%	20.33
Flanges	LL	207	8760	1.00	0.000008	14.51	32.06	0%	32.06
Flanges	LL-E	129	8760	1.00	0.000008	9.04	19.98	0%	19.98
Flanges	HL	104	8760	1.00	0.000008	7.29	16.11	0%	16.11
TOTAL VOC EMISSIONS							338.25		188.94
Incoming/Outgoing Mainline									
Equipment type	**Type of Service**	**Equipment Count**	**Hours of operation**	**Weight fraction /1/**	**Emission factor /2/ (kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**	**Control effectiveness applied**	**Controlled VOC emissions (lb\yr)**
Pump Seals	LL	1	8760	1.00	0.00054	4.73	10.45	45%	5.75
Pipeline Valves	LL	9	8760	1.00	0.000043	3.39	7.49	61%	2.92
Flanges	LL	36	8760	1.00	0.000008	2.52	5.58	0%	5.58
TOTAL VOC EMISSIONS							23.52		14.25
Mainline Metering									
Equipment type	**Type of Service**	**Equipment Count**	**Hours of operation**	**Weight fraction /1/**	**Emission factor /2/ (kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**	**Control effectiveness applied**	**Controlled VOC emissions (lb\yr)**
Pipeline Valves	LL	30	8760	1.00	0.000043	11.30	24.97	61%	9.74
Flanges	LL	136	8760	1.00	0.000008	9.53	21.06	0%	21.06
TOTAL VOC EMISSIONS							46.04		30.80

TABLE 3.2-12 (CONTINUED)
FUGITIVE EMISSIONS FROM EQUIPMENT LEAKS - KITTITAS TERMINAL

Tank Metering									
Equipment type	**Type of Service**	**Equipment Count**	**Hours of operation**	**Weight fraction /1/**	**Emission factor /2/ (kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**	**Control effectiveness applied**	**Controlled VOC emissions (lb\yr)**
Pump Seals	LL	1	8760	1.00	0.00054	4.73	10.45	45%	5.75
Pipeline Valves	LL	14	8760	1.00	0.000043	5.27	11.65	61%	4.55
Flanges	LL	27	8760	1.00	0.000008	1.89	4.18	0%	4.18
TOTAL VOC EMISSIONS							26.29		14.48
Manifold									
Equipment type	**Type of Service**	**Equipment Count**	**Hours of operation**	**Weight fraction /1/**	**Emission factor /2/ (kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**	**Control effectiveness applied**	**Controlled VOC emissions (lb\yr)**
Pump Seals	LL	1	8760	1.00	0.00054	4.73	10.45	45%	5.75
Pipeline Valves	LL	14	8760	1.00	0.000043	5.27	11.65	61%	4.55
Pipeline Valves	HL	6	8760	1.00	0.000043	2.26	4.99	61%	1.95
Flanges	LL	39	8760	1.00	0.000008	2.73	6.04	0%	6.04
Flanges	HL	21	8760	1.00	0.000008	1.47	3.25	0%	3.25
TOTAL VOC EMISSIONS							36.40		21.54
Load Pumps									
Equipment type	**Type of Service**	**Equipment Count**	**Hours of operation**	**Weight fraction /1/**	**Emission factor /2/ (kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**	**Control effectiveness applied**	**Controlled VOC emissions (lb\yr)**
Pump Seals	LL	8	8760	1.00	0.00054	37.84	83.63	45%	46.00
Pump Seals	LL-E	2	8760	1.00	0.00054	9.46	20.91	45%	11.50
Pump Seals	HL	4	8760	1.00	0.00054	18.92	41.82	45%	23.00
Pipeline Valves	LL	18	8760	1.00	0.000043	6.78	14.98	61%	5.84
Pipeline Valves	LL-E	6	8760	1.00	0.000043	2.26	4.99	61%	1.95
Pipeline Valves	HL	12	8760	1.00	0.000043	4.52	9.99	61%	3.90
Flanges	LL	48	8760	1.00	0.000008	3.36	7.43	0%	7.43
Flanges	LL-E	16	8760	1.00	0.000008	1.12	2.48	0%	2.48
Flanges	HL	32	8760	1.00	0.000008	2.24	4.96	0%	4.96
TOTAL VOC EMISSIONS							191.20		107.05
Vapor Recovery Unit									
Equipment type	**Type of Service**	**Equipment Count**	**Hours of operation**	**Weight fraction /1/**	**Emission factor /2/ (kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**	**Control effectiveness applied**	**Controlled VOC emissions (lb\yr)**
Pump Seals	V	1	8760	1.00	0.00065	0.57	1.26	45%	0.69
Pump Seals	LL	4	8760	1.00	0.00054	18.92	41.82	45%	23.00
Pipeline Valves	V	8	8760	1.00	0.000013	0.91	2.01	70%	0.60
Pipeline Valves	LL	3	8760	1.00	0.000043	1.13	2.50	61%	0.97
Flanges	V	22	8760	1.00	0.000042	8.09	17.89	0%	17.89

TABLE 3.2-12 (CONTINUED)

FUGITIVE EMISSIONS FROM EQUIPMENT LEAKS - KITTITAS TERMINAL

Flanges	LL	9	8760	1.00	0.000008	0.63	1.39	0%	1.39
TOTAL VOC EMISSIONS							66.87		44.55
Tankline 1-Transmix									
Equipment type	**Type of Service**	**Equipment Count**	**Hours of operation**	**Weight fraction /1/**	**Emission factor /2/ (kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**	**Control effectiveness applied**	**Controlled VOC emissions (lb\yr)**
Pipeline Valves	LL	6	8760	1.00	0.000043	2.26	4.99	61%	1.95
Flanges	LL	10	8760	1.00	0.000008	0.70	0.70	0%	1.55
TOTAL VOC EMISSIONS							6.54		3.50
Tankline 2-Ethanol									
Equipment type	**Type of Service**	**Equipment Count**	**Hours of operation**	**Weight fraction /1/**	**Emission factor /2/ (kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**	**Control effectiveness applied**	**Controlled VOC emissions (lb\yr)**
Pipeline Valves	LL-E	3	8760	1.00	0.000043	1.13	2.50	61%	0.97
Flanges	LL-E	5	8760	1.00	0.000008	0.35	0.77	0%	0.77
TOTAL VOC EMISSIONS							3.27		1.75
Tanklines 3, 5 & 6 - Gas (Each)									
Equipment type	**Type of Service**	**Equipment Count**	**Hours of operation**	**Weight fraction /1/**	**Emission factor /2/ (kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**	**Control effectiveness applied**	**Controlled VOC emissions (lb\yr)**
Pipeline Valves	LL	4	8760	1.00	0.000043	1.51	3.33	61%	1.30
Flanges	LL	8	8760	1.00	0.000008	0.56	1.24	0%	1.24
TOTAL VOC EMISSIONS-each tankline							4.57		2.54
TOTAL VOC EMISSIONS							13.71		7.61
Tankline 4-Gas									
Equipment type	**Type of Service**	**Equipment Count**	**Hours of operation**	**Weight fraction /1/**	**Emission factor /2/ (kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**	**Control effectiveness applied**	**Controlled VOC emissions (lb\yr)**
Pipeline Valves	LL	5	8760	1.00	0.000043	1.88	4.16	61%	1.62
Flanges	LL	10	8760	1.00	0.00008	0.70	1.55	0%	1.55
TOTAL VOC EMISSIONS							5.71		3.17
Tanklines 7, 8, 9 & 10 -Diesel/Turbine (Each)									
Equipment type	**Type of Service**	**Equipment Count**	**Hours of operation**	**Weight fraction /1/**	**Emission factor /2/ (kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**	**Control effectiveness applied**	**Controlled VOC emissions (lb\yr)**
Pipeline Valves	HL	4	8760	1.00	0.000043	1.51	3.33	61%	1.30
Flanges	HL	8	8760	1.00	0.000008	0.56	1.24	0%	1.24
TOTAL VOC EMISSIONS-each tankline							4.57		2.54
TOTAL VOC EMISSIONS							18.28		10.15
FACILITY-WIDE FUGITIVE EMISSIONS							816.01		471.71
TONS PER YEAR							0.41		0.24

Uses Gas. Distr. MACT/API emission factors: LL= light liquid (gasoline): LL-E=ethanol: HL= heavy liquid (diesel/turbine): V=vapor service.

LDAR program according to 40 CFR 61 SUBPART V: source: EIIP, 12/96

Summary of VOC Emissions at Kittitas

The VOC emissions calculated for the proposed facilities are summarized in Table 3.2-13. At the Kittitas Terminal, the estimated 15.39 tons per year of VOC emissions is less than the 100 ton threshold which defines a major source (WAC 173-44-030); however, the facility will be required under WAC 173-400-102(3) to register and report annually to EFSEC.

TABLE 3.2-13
SUMMARY OF VOC EMISSIONS FROM THE PROPOSED PIPELINE

Emission Source	Emission (tons per year)
Kittitas Terminal	
Storage Tank Losses	14.22
Truck Loading Losses	.91
Fugitive Emissions	.26
Total VOC Emissions at the Kittitas Terminal	15.39
Thrasher Pump Station	<1
All Other Pump Stations	<1

Toxic Pollutant Emissions Estimates

Toxic pollutants are regulated under WAC 173-460. Any new source of listed toxic emissions must demonstrate T-BACT is utilized as an emission control. New sources must also show compliance with Ambient Significant Impact Levels (ASILs) for Class A and Class B toxics.

Emission estimates of toxic pollutants were calculated utilizing a speciation method. This method requires the use of published speciation profiles for the fuels stored at the bulk terminal facility. The state of California Air Resources Board (CARB) publishes VOC species profiles for each of the fuels at the facility (CARB, 1991). The speciation profiles are included in Appendix G for each fuel characterized. Total predicted VOCs from each source were multiplied by the corresponding speciation factor to produce toxic pollutant emission estimates for the corresponding Class A and Class B toxic. For the storage tanks, total VOCs per gasoline blend were calculated by adding the VOCs from each month using the corresponding RVP blend. For example, the summer blend RVP10 VOC value in Table 3.2-14 was calculated by adding predicted VOC emissions presented in Table 3.2-10 for the months of May through August. Even though the RVP restriction period extends to September 15, emissions for the complete month of September were assumed to have an associated RVP blend of 13- a worst-case scenario. Small Quantity Emission Rates (SQER) and corresponding ASILs for each of the pollutants are shown in Tables 3.2-14 through 3.2-16.

TABLE 3.2-14

TOXIC EMISSIONS FROM STORAGE TANKS

Storage Tank		Total VOCs emitted (lb/yr)	Pollutant Emissions (lb/yr)											
			Xylene	Toluene	Benzene	n-Hexane	Cyclo-pentane	Cyclo-hexane	n-Heptane	Isomers of Hexane	Ethyl Alcohol	Methyl-cyclo-hexane	Ethyl-benzene	Total HAPs
1- Transmix-	RVP 10	734.54	0.73	4.41	5.14	13.22	5.14	1.47	2.20	34.52	0.00	0.73	0.00	67.58
	RVP 13	1,497.68	14.98	29.95	22.47	26.96	8.99	7.49	11.98	58.41	0.00	7.49	3.00	191.70
2- Ethanol		128.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	128.69	0.00	0.00	128.69
3- Premium-	RVP 10	2,361.96	2.36	14.17	16.53	42.52	16.53	4.72	7.09	111.01	0.00	2.36	0.00	217.30
	RVP 13	4,772.43	47.72	95.45	71.59	85.90	28.63	23.86	38.18	186.12	0.00	23.86	9.54	610.87
4- Regular-	RVP 10	1,965.30	1.97	11.79	13.76	35.38	13.76	3.93	5.90	92.37	0.00	1.97	0.00	180.81
	RVP 13	3,972.75	39.73	79.46	59.59	71.51	23.84	19.86	31.78	154.94	0.00	19.86	7.95	508.51
5- Regular-	RVP 10	1,965.30	1.97	11.79	13.76	35.38	13.76	3.93	5.90	92.37	0.00	1.97	0.00	180.81
	RVP 13	3,972.75	39.73	79.46	59.59	71.51	23.84	19.86	31.78	154.94	0.00	19.86	7.95	508.51
6- Regular-	RVP 10	1,965.30	1.97	11.79	13.76	35.38	13.76	3.93	5.90	92.37	0.00	1.97	0.00	180.81
	RVP 13	3,972.75	39.73	79.46	59.59	71.51	23.84	19.86	31.78	154.94	0.00	19.86	7.95	508.51
7- High Sulfur Diesel		321.17	0.00	0.00	0.00	28.91	0.00	3.21	27.62	9.64	0.00	0.00	0.00	69.37
8- High Sulfur Diesel		339.93	0.00	0.00	0.00	30.59	0.00	3.40	29.23	10.20	0.00	0.00	0.00	73.42
9- Lo Sulfur Diesel		455.51	0.00	0.00	0.00	41.00	0.00	4.56	39.17	13.67	0.00	0.00	0.00	98.39
10- Jet Turbine Fuel		17.71	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02
Total (lb/yr)		28,443.77	190.88	417.72	335.77	589.75	172.08	120.09	268.53	1,165.49	128.69	99.93	36.38	3,525.31
TOTAL (Tons/yr)		14.22	0.10	0.21	0.17	0.29	0.09	0.06	0.13	0.58	0.06	0.05	0.02	1.76
Small Quantity Emission Rate - lb/yr			43748	43748	20	22750	43748	43748	43748	43748	43748	43748	43748	
ASIL - Class A Toxic (ug/m3)(Annual)					0.12									
ASIL - Class B Toxic (ug/m3)(24-hr)			1500	400		200	5700	3400	5500	5900	6300	5400	1000	
Exceeds SQER					x									

TABLE 3.2-15

AIR TOXICS EMISSIONS
CROSS CASCADES PIPE LINE PROJECT-TRUCK LOADING LOSSES

Truck Loading - Main Rack- 99% Carbon adsorption unit	Total VOCs emitted (lb/yr)	Toxic Emissions (lb/yr)											
		Xylene	**Toluene**	**Benzene**	**n-Hexane**	**Cyclo-pentane**	**Cyclo-hexane**	**n-Heptane**	**Isomers of Hexane**	**Ethyl Alcohol**	**Methyl-cyclo-hexane**	**Ethyl-benzene**	**Total HAPs**
Gasoline - RVP 10	641.08	0.64	3.85	**4.49**	11.54	4.49	1.28	1.92	30.13	0.00	0.64	0.00	58.98
Gasoline - RVP 13	1,169.93	11.70	23.40	**17.55**	21.06	7.02	5.85	9.36	45.63	0.00	5.85	2.34	149.75
Diesel - All grades	2.36	0.00	0.00	**0.0**	0.21	0.00	0.02	0.20	0.07	0.00	0.00	0.00	0.51
Jet Turbine Fuel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total (lb/yr)	1,813.37	12.34	27.25	**22.04**	32.81	11.51	7.16	11.49	75.83	0.00	6.49	2.34	209.24
TOTAL (Tons/yr)	0.91	0.01	0.01	**0.01**	0.02	0.01	0.00	0.01	0.04	0.00	0.00	0.00	0.10
Small Quantity Emission Rate - lb/yr		43,748	43,748	**20**	22,750	43,748	43,748	43,748	43,748	43,748	43748	43748	
ASIL - Class A Toxic (ug/m3)(Annual)				**0.12**									
ASIL - Class B Toxic (ug/m3)(24-hr)		1,500	400		200	5,700	3,400	5,500	5,900	6,300	5,400	1,000	
Exceeds SQER				***x***									

TABLE 3.2-16

AIR TOXICS EMISSIONS
CROSS CASCADES PIPE LINE PROJECT-FUGITIVE EMISSIONS

Fugitive Emissions from the Kittitas Terminal	Total VOCs emitted (lb/yr)	Toxic Emissions (lb/yr)											
		Xylene	Toluene	Benzene	n-Hexane	Cyclo-pentane	Cyclo-hexane	n-Heptane	Isomers of Hexane	Ethyl Alcohol	Methyl-cyclo-hexane	Ethyl-benzene	Total HAPs
Gasoline - RVP 10	117.49	0.12	0.70	**0.82**	2.11	0.82	0.23	0.35	5.52	0.00	0.12	0.00	10.81
Gasoline - RVP 13	208.88	2.09	4.18	**3.13**	3.76	1.25	1.04	1.67	8.15	0.00	1.04	0.42	26.74
Diesel - All grades	81.55	0.00	0.00	**0.00**	7.34	0.00	0.82	7.01	2.45	0.00	0.00	0.00	17.61
Jet Turbine Fuel	2.54	0.00	0.00	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethanol	61.26	0.00	0.00	**0.00**	0.00	0.00	0.00	0.00	0.00	61.26	0.00	0.00	61.26
Total (lb/yr)	471.71	2.21	4.48	**3.96**	13.21	2.08	2.09	9.04	16.11	61.26	1.16	0.42	116.42
TOTAL (Tons/yr)	0.24	0.00	0.00	**0.00**	0.01	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.06
Small Quantity Emission Rate - lb/yr													
ASIL - Class A Toxic (ug/m3)(Annual)													
ASIL - Class B Toxic (ug/m3)(24-hr)													
Exceeds SQER				***x***									

Pump Station Emission Calculations

Construction

There is currently no specific information available to estimate construction emissions at the pump stations. However, due to the small site areas required, site disturbance during construction of the pump stations is not expected to generate significant fugitive emissions.

Operation

The operation of the Thrasher, North Bend, Stampede, Beverly Burke, and Othello pump stations and the Pasco delivery facility is not expected to produce emissions of criteria pollutants. All equipment at each of the stations is operated electrically and therefore emissions would be negligible. However, leaks from equipment are a potential source of fugitive VOC emissions.

All of the pump stations have similar design, with the exception of the Thrasher Station. Additional valves, pipeline hardware, and connections will be required at this station and the Pasco delivery facility, as they tie either into an existing pipeline and existing delivery facilities. Predicted emissions for the Thrasher Station and all other pump stations are presented in Table 3.2-17. The rationale used to calculate fugitive emissions from the pump stations is the same used for the calculation of fugitive VOC losses from equipment leaks at the Kittitas Terminal. Each of the pump stations is expected to emit less than 1 ton per year of VOCs, and is therefore considered an insignificant source. The pump stations and the Pasco delivery facility will not require registration with the State due to insignificant emissions.

Toxic pollutant emission calculations were limited to benzene, the only toxic pollutant of concern at the Kittitas Terminal. Benzene emissions from the Thrasher Station and Pasco delivery facility were estimated using the benzene percent constituent of RVP13 gasoline, 1.5%. Total benzene emitted equal less than 3.0 pounds per year, well below the SQER for benzene. All other pump stations were estimated to emit 0.5 pounds per year of benzene. The pump stations are therefore considered an insignificant source for toxic pollutants.

TABLE 3.2-17
FUGITIVE EMISSIONS FROM PUMP STATIONS

Thrasher Pump Station:						
Equipment type	**Equipment count**	**Hours of operation**	**Weight fraction**[1]	**Emission factor**[2] **(kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**
Pump Seals	3	8760	1.00	0.00054	14.19	31.36
Pipeline Valves	90	8760	1.00	0.0000416	33.90	74.92
Flanges/Connectors (Pairs)	73	8760	1.00	0.000038	5.12	11.31
TOTAL VOC EMISSIONS					53.21	117.59
TONS PER YEAR VOCs						0.06

Pasco Delivery Facility						
Equipment type	**Equipment count**	**Hours of Operation**	**Weight fraction**[1]	**Emission factor**[2] **(kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**
Pump Seals	4	8760	1.00	0.00054	18.92	41.82
Pipeline Valves	128	8760	1.00	0.000043	48.22	106.56
Flanges/Connectors	173	8760	1.00	0.000008	12.12	26.79
TOTAL VOC EMISSIONS					79.26	175.17
TONS PER YEAR VOCs						0.09

All Other Pump Stations						
Equipment type	**Equipment count**	**Hours of operation**	**Weight fraction**[1]	**Emission factor**[2] **(kg\hr\source)**	**VOC emissions (kg\yr)**	**VOC emissions (lb\yr)**
Pump Seals	3	8760	1.00	0.00054	14.19	31.36
Pipeline Valves	50	8760	1.00	0.000043	18.83	41.62
Flanges/Connectors (Pairs)	38	8760	1.00	0.000008	2.66	5.89
TOTAL VOC EMISSIONS					35.69	78.89
TONS PER YEAR VOCs						0.04

[1] Assumes VOC content of fuel = 100%   EQ: VOC = avgEF * wtF * Nequip* hr/yr
[2] Revised 1995 leaks document emission factors using light liquid service.

3.2.2 ODOR

The ISCST3 model was run with emissions from all sources at the Kittitas gasoline distribution facility (including the proposed emission controls described elsewhere in this application), and the full set of hypothetical meteorological inputs from the SCREEN3 model to estimate the maximum incremental one-hour VOC concentration that would occur due to operations of the proposed facility. This value was estimated to be 126.43 $\mu g/m^3$ at a receptor near the midpoint of the western fenceline of the facility. This predicted maximum concentration was used as the basis for an evaluation of the maximum potential for off-site odor impacts in several different ways, as described below.

First, the predicted VOC concentration was multiplied by an assumed peak-to-mean ratio of 2.0 to account for the fact that odor detection occurs on a time scale smaller than one hour. This factor corresponds roughly to the use of the power law relationship in Turner (1969) for scaling from a one-hour average concentration to a maximum 1-minute concentration, which is a more suitable basis for evaluating odor effects.

Next, the assumed maximum 1-minute concentration of VOC was apportioned according to the mass fractions of constituent compounds in gasoline vapors, since these vapors are the dominant category of VOC emissions for the proposed facility. The weight distribution of summer blend gasoline constituents is shown in Table 3.2-18. Also shown in this table are the published air odor detection thresholds for a number of these compounds - odor data were located for compounds comprising about two-thirds of the gasoline vapors by weight. The weight fraction for an individual compound divided by its respective threshold concentration was used as a surrogate indicator for that constituent's odor potential. As shown in the right-hand column of Table 3.2-18, the compound with the highest odor potential among those with published odor thresholds is toluene. The fraction of toluene in the maximum predicted 1 minute fenceline concentration is calculated as follows:

2 x 126.43 $\mu g/m^3$ VOC x 0.006 toluene weight fraction = 1.52 $\mu g/m^3$ or 0.0004 ppm toluene

This concentration of toluene is several orders of magnitude below the odor detection threshold concentration for this compound, which is 2.9 ppm. Note that even if the entire 252.86 $\mu g/m^3$ of predicted VOC occurred in the form of toluene (molecular weight 92.13), this would correspond to a volume concentration of only 0.067 ppm. Based on this result the concentrations of other compounds with lesser odor potentials would also be far below their respective detection levels.

A 1994 study sponsored by the American Petroleum Institute (API 1994) developed odor threshold data for gasoline with and without MTBE, an important additive used in reformulated gasoline. For winter and summer blend gasolines without MTBE, the reported odor detection thresholds were 0.479 ppm and 0.576 ppm respectively. Using a mean gasoline molecular weight of 75, these figures translate to mass concentrations of 1,494 and 1,797 μg/m^3, respectively. Both of these figures are well above the maximum one-minute VOC concentration predicted by ISCST3.

The API study showed that gasolines with MBTE at 3% and 15% by weight had lower odor detection thresholds, specifically, 0.5 ppm and 0.113 ppm, respectively. Conversion of these thresholds to mass concentration units yields values of 1,559 and 352 μg/m^3. However, oxygenated fuels containing this additive are not used in the State of Washington, so these results do not apply to the Kittitas facility.

Based on all the above information, it is therefore concluded that no odor impacts would occur outside the fenceline of the proposed Kittitas terminal. Thus, the emission controls that will be employed to minimize VOC emissions from the storage tanks, the truck loading rack, and fugitives from components throughout the facility will also prevent off-site odors.

TABLE 3.2-18
DATA USED IN ODOR DETECTION DETERMINATION FOR THE PROPOSED KITTITAS GASOLINE DISTRIBUTION FACILITY

Species	Weight Fraction1	Published Odor Threshold (ppm)2	Weight Fraction/Odor Threshold (ppm-1)
benzene	0.007	12	0.0006
cis-butene	0.009		
cyclopentane	0.007		
cyclopentene	0.002		
isobutane	0.0979		
isomers of hexane	0.047	130	0.00036
isomers of pentane	0.266	400	0.00066
methylcyclohexane	0.001		
methylcyclopentane	0.016		
n-butane	0.228	2700	0.000084
n-heptane	0.003	150	0.00002
n-hexane	0.018	130	0.00014
n-pentane	0.085	400	0.0002
propane	0.012	16,000	0.0000006
toluene	0.006	2.9	0.002
trans-2-butene	0.012		
1-hexene	0.002		
1-pentene	0.01		
2-methyl-1-butene	0.019		
2-methyl-2-butene	0.01		
2,2-dimethybutane	0.012		
2,4-dimethylpentane	0.005		
3-methyl-1-butene	0.004		
3-methylhexane	0.023		
unknown	0.0981		

1 Gasoline speciation data obtained from California Air Resources Board (CARB, 1991)

2 Air odor thresholds obtained from "Odor as an Aid to Chemical Safety: Odor Thresholds Compared with Threshold Limit Values and Volatiles for 214 Industrial Chemicals in Air and Water Dilution", Amoore and Hautala (1983)

3.2.3 CLIMATE, VISIBLE PLUMES, AND VISIBILITY IMPAIRMENT

Climate

A complete discussionof climate and meteorological conditions associated with the proposed Kittitas Temrinal and along the pipeline route is discussed in Section 3.2.1.3 above.

Visible Plumes and Visibility Impairment

The proposed Kittitas Terminal and pipeline project does not include a proposed emission source which may cause visibility degradation or visible plumes. There are no combustion sources, point sources, or cooling towers which are typically encountered in EFSEC applications which are typically the source for visibility degradation.

3.2.4 DUST

A complete analysis regarding fugitive dust emissions is included in Section 3.2.1. Impacts of dust generated during construction are expected to be localized. Sources of dust will be from excavation on the mainline right of way and from traffic on access roads during construction of the pipeline systems. Due to the remote location of the majority of the pipeline impacts on populations are expected to be minimal.

3.2.5 MITIGATION MEASURES

The mitigation measures for air emissions during operation are included within the designs of the pump stations, Kittitas Terminal and Pasco delivery facilities. There are no additional mitigation measures proposed for the Kittitas Terminal or for the pipeline operations concerning air emissions other than what is included in the design.

Mitigation measures for dust control during construction will consist of:

- Watering the right of way periodically as necessary.
- Applying gravel to access roads where traffic volume is high and where the road surface will need improvement.
- Curtailing construction activities when high winds are contributing to excessive dust.
- Reducing speed limits on the right of way during construction to 10 mph.

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